

THE INVENTION CLAIMED IS

1. A method for detecting pathogens attached to specific antibodies, comprising:

providing a fluidic channel with at least one pair of spaced electrodes,

providing an AC or DC power source to produce an electric field

across the at least one pair of spaced electrodes,

depositing antibodies on the spaced electrodes,

measuring the impedance between the spaced electrodes,

directing a sample fluid containing pathogen past the spaced electrodes,

measuring the impedance between the spaced electrodes, and

determining the presence of pathogen attached to the antibodies by comparing the impedance measurements.

2. The method of Claim 1, additionally including directing antibody-coated beads past the space electrodes for attachment to the pathogen, and determining the attachment of the antibody-coated beads by measuring the impedance between the spaced electrode and comparing with an impedance measure prior to directing the antibody-coated beads past the spaced electrodes.

SEARCHED
INDEXED
SERIALIZED
FILED

5

10

5

3. The method of Claim 1, wherein the at least one pair of electrodes comprises a plurality of adjacent spaced pairs of electrodes.
4. The method of Claim 1, wherein the at least one pair of spaced electrodes is formed on surfaces of the fluidic channel.
5. The method of Claim 4, wherein forming the spaced electrodes on the surfaces of the fluidic channel is carried out by depositing an interdigitated electrode on the surfaces whereby adjacent fingers of the interdigitated electrode form at least one pair of spaced electrodes.
6. The method of Claim 5, additionally including forming the interdigitated electrode to produce a plurality of sets of adjacent pairs of electrodes.
7. The method of Claim 1, additionally including providing an impedance sensor assembly operatively connected to at least one pair of spaced electrodes for measuring the impedance between the spaced electrodes, an including impedance readout means.
8. The method of Claim 7, additionally includes providing reference electrodes in insulated and spaced relation to the at least one pair of spaced electrodes, and electrically connecting the impedance sensor assembly to the reference electrodes.

SEARCHED INDEXED
SERIALIZED FILED

9. The method of Claim 7, wherein providing the impedance sensor assembly is carried out by at least amplifiers and mixers to measure the in-phase and out-of-phase impedance.

10. An apparatus for determining the trapping of pathogen by antibodies deposited in a fluidic channel, comprising:
a fluidic channel having at least one pair of spaced electrodes therein,
antibodies located on said spaced electrodes,
means for producing an electric field across said spaced electrodes, and
an impedance sensor for measuring impedance between said spaced electrodes.

11. The apparatus of Claim 10, additionally including at least one pair of reference electrodes located in spaced relation to said at least one pair of spaced electrodes, an insulator located between said reference electrodes and said pair of spaced electrodes, said reference electrodes being electrically connected to said impedance sensor.

12. The apparatus of Claim 10, wherein said at least one pair of spaced electrodes is located on a surface of said fluidic channel.

13. The apparatus of Claim 12, wherein said at least one pair of spaced electrodes comprises a plurality of adjacent pairs of spaced electrodes.

Sub D1

14. The apparatus of Claim 13, wherein said plurality of adjacent pairs of spaced electrodes are formed by adjacent fingers of an interdigitated electrode located on the surface of said fluidic channel.

Sub C2 Sub A2

15. The apparatus of Claim 10, wherein said means comprises an AC power supply.

Sub C2 Sub A2

16. A sensor using impedance measurements to detect the presence of pathogens attached to antibodies, comprising:

a microfluidic device having at least one microchannel therein,
spaced electrodes located on a surface of said microchannel,
antibodies located on said spaced electrodes,
an AC or DC power supply for producing an electric field
across said spaced electrodes, and
means for measuring impedance between said spaced
electrodes.

Sub A2

17. The sensor of Claim 16, wherein said spaced electrodes comprise fingers of an interdigitated electrode forming on said surface of said microchannel.

18. The sensor of Claim 17, wherein said interdigitated electrode includes fingers forming a plurality of adjacent pairs of spaced electrodes.

19. The sensor of Claim 15, additionally including reference electrodes located in insulated relation to said spaced electrodes and electrically

Sub D1
S1B
A3
B3
D1
S1C
A4
B4
D2
S2B
A5
B5
D3
S2C
A6
B6
D4
S2D
A7
B7
D5
S2E
A8
B8
D6
S2F
A9
B9
D7
S2G
A10
B10
D8
S2H
A11
B11
D9
S2I
A12
B12
D10
S2J
A13
B13
D11
S2K
A14
B14
D12
S2L
A15
B15
D13
S2M
A16
B16
D14
S2N
A17
B17
D15
S2O
A18
B18
D16
S2P
A19
B19
D17
S2Q
A20
B20
D18
S2R
A21
B21
D19
S2S
A22
B22
D20
S2T
A23
B23
D21
S2U
A24
B24
D22
S2V
A25
B25
D23
S2W
A26
B26
D24
S2X
A27
B27
D25
S2Y
A28
B28
D26
S2Z
A29
B29
D27
S2AA
A30
B30
D28
S2BB
A31
B31
D29
S2CC
A32
B32
D30
S2DD
A33
B33
D31
S2EE
A34
B34
D32
S2FF
A35
B35
D33
S2GG
A36
B36
D34
S2HH
A37
B37
D35
S2II
A38
B38
D36
S2JJ
A39
B39
D37
S2KK
A40
B40
D38
S2LL
A41
B41
D39
S2MM
A42
B42
D40
S2NN
A43
B43
D41
S2OO
A44
B44
D42
S2PP
A45
B45
D43
S2QQ
A46
B46
D44
S2RR
A47
B47
D45
S2UU
A48
B48
D46
S2VV
A49
B49
D47
S2WW
A50
B50
D48
S2XX
A51
B51
D49
S2YY
A52
B52
D50
S2ZZ
A53
B53
D51
S2AA
A54
B54
D52
S2BB
A55
B55
D53
S2CC
A56
B56
D54
S2DD
A57
B57
D55
S2EE
A58
B58
D56
S2FF
A59
B59
D57
S2GG
A60
B60
D58
S2HH
A61
B61
D59
S2II
A62
B62
D60
S2JJ
A63
B63
D61
S2KK
A64
B64
D62
S2LL
A65
B65
D63
S2MM
A66
B66
D64
S2NN
A67
B67
D65
S2OO
A68
B68
D66
S2PP
A69
B69
D67
S2QQ
A70
B70
D68
S2RR
A71
B71
D69
S2UU
A72
B72
D70
S2VV
A73
B73
D71
S2WW
A74
B74
D72
S2XX
A75
B75
D73
S2YY
A76
B76
D74
S2ZZ
A77
B77
D75
S2AA
A78
B78
D76
S2BB
A79
B79
D77
S2CC
A80
B80
D78
S2DD
A81
B81
D79
S2EE
A82
B82
D80
S2FF
A83
B83
D81
S2GG
A84
B84
D82
S2HH
A85
B85
D83
S2II
A86
B86
D84
S2JJ
A87
B87
D85
S2KK
A88
B88
D86
S2LL
A89
B89
D87
S2MM
A90
B90
D88
S2NN
A91
B91
D89
S2OO
A92
B92
D90
S2PP
A93
B93
D91
S2QQ
A94
B94
D92
S2RR
A95
B95
D93
S2UU
A96
B96
D94
S2VV
A97
B97
D95
S2WW
A98
B98
D96
S2XX
A99
B99
D97
S2YY
A100
B100
D98
S2ZZ
A101
B101
D99

connected to said means for measuring impedance.

20. The sensor of Claim 16, wherein said means for measuring impedance between said spaced electrodes includes a plurality of signal generators, a current sensor connected to at least one electrode, a plurality of amplifier/mixer assemblies connected in parallel to said current sensor, said signal generators each being connected to one of said amplifier/mixer assemblies, and one of said signal generators being additionally connected to another of said spaced electrodes.

21. The sensor of Claim 1, wherein the at least one pair of spaced electrodes is formed within the fluidic channel

add
B4